DRAFT McGill Strategic Research Plan 2013 – 2016:
Understanding and Improving the Human Condition in a Globalized World

Section 1: Introduction and Overview

Vision

McGill strives to be a world-class research-intensive, student-centred university with an enduring sense of public purpose. Fundamental to this vision is the need to identify, support, and promote research excellence wherever it is found across our campuses, in the field, or emerging through external partnerships. This Strategic Research Plan (SRP), entitled *Understanding and Improving the Human Condition in a Globalized World,* expresses McGill's central goal of seeking out knowledge and exchanging new ideas with our communities – Montreal, Quebec, Canada, and internationally – as well as our tradition of bringing people together across disciplines to find solutions to complex problems.

Achieving Our Goals

McGill has a strong history of achievement, consistently ranking as one of Canada's best medical-doctoral universities and as one of the top universities in the world. McGill is also renowned for attracting some of the brightest young thinkers and researchers, all of whom contribute immeasurably to the advancement of knowledge. Past success, however, does not guarantee future accomplishments. This Strategic Research Plan, therefore, reaffirms our dedication to the transformative power of ideas and excellence in a rapidly changing research environment.

In that spirit, the first section of this Strategic Research Plan describes the scope and reach of McGill's research enterprise as captured in seven "Areas of Research Excellence." The second section identifies strategic objectives designed to enhance McGill's ability to provide distinctive contributions to research, teaching and training, and service to community, both locally and beyond. As outlined below, we will continue to streamline administrative procedures, increase opportunities for interdisciplinary collaboration, and explore new organizational models for research teams in order to realize this plan's vision.

The Unique Character of McGill Research

Founded in 1821, McGill both belongs to the world and is firmly rooted in Montreal – a city where different languages, cultures, and perspectives not only co-exist, but come together to create a truly

unique community that is stronger because of its diverse parts. The city, while being multicultural and multiethnic, has retained strong connections to the Canadian traditions, values, and systems of its French, British, and First Peoples predecessors. With all the interaction between groups of people from different backgrounds, it is no wonder that Montreal has long been home to incredibly vibrant cultural and artistic communities, as well as social innovators, particularly in psycho-social prevention, education, and service delivery sectors.

McGill benefits immensely from its location at the centre of a veritable hub of intellectual and scientific activity. Montreal is home to nine universities and has the highest concentration of postsecondary students in North America. In addition to its academic institutions, major government laboratories and research-intensive industry are situated in Montreal. These organizations anchor research clusters in life sciences, aeronautics, videogames, and information and communication technologies.

The intellectual and cultural vitality of Montreal contributes to McGill's ability to attract the very best students from Canada and around the world. In fact, our undergraduates consistently have the highest entering grades in the country, and the University has the largest percentage of international students among Canada's top research universities. McGill nurtures this talent by placing a special emphasis on the nexus between research and education, recognizing that top students at all levels are inspired by novel ideas and practices, are essential to our research enterprise, and are the next generation of leaders.

Local diversity and knowledge enhance the University's ability to collaborate with a diverse range of partners, such as government, industry, community organizations, and other universities. As a result, this Strategic Research Plan envisions McGill as the best kind of partner – one that is efficient, creative, and flexible in administration and whose specialized researchers freely share and benefit from expertise and joint facilities. Likewise, the SRP commits to the goals of extending the global impact of our research activities, encouraging new and stronger partnerships, delivering quality research experience for trainees, and tapping into the worldwide pool of knowledge while contributing to its advancement.

Purpose of the Document

The SRP is an essential tool that enables the University to inform strategic resource allocation – specifically the distribution of Canada Research Chairs and Canada Foundation for Innovation investments – and is a reference for reporting, fundraising, and promoting our world-class researchers and talented students.

Consultations for the SRP occurred simultaneously with those for ASAP 2012: Achieving Strategic Academic Priorities, which will integrate the Areas of Research Excellence into its own emphasis on interdisciplinary research and teaching at McGill. Efforts have been made to align the document with other critical strategic plans as well, including Vision 2020, McGill's sustainability plan, and strategic research priorities from our faculties. It is our hope that the SRP will provide McGill faculties, departments, centres, institutes, and individual researchers with the freedom and flexibility necessary to

pursue their own goals while understanding how their work supports and interacts with the University's strategic vision. Finally, implementation strategies rely on institutional commitments to increase efficiency and connectivity across a broad spectrum of University endeavours.

At the same time, this Strategic Research Plan remains a "living document." It will be revised and adjusted accordingly as new challenges and opportunities arise on the research landscape or as the social, cultural, economic, and educational realities of our world evolve.

Section 2: Core Commitments

Ideas – Universities are uniquely situated to pursue knowledge and understanding for their own sake. For that reason, basic research remains the lifeblood of McGill's research enterprise. Wherever research may ultimately lead, we recognize that all advancements begin with ideas. We strongly believe that the pursuit of knowledge and fundamental discovery helps us to better understand the world and take incremental steps, sometimes in unexpected ways, toward a better future. As such, curiosity-driven research is and will remain the core of our research enterprise.

Innovation – Increasing emphasis on innovation in all its forms – social, pedagogical, and organizational innovation, as well as the development of new technologies – allows us to play a leading role in a knowledge-based society. We seek not only to implement best practices in teaching and training but to increase the impact of research by translating the results into social and commercial applications. This may take the form of communicating research discoveries to decision-makers, transferring knowledge and know-how, protecting ideas and inventions, licensing discoveries, or even creating new spin-off companies or non-profit organizations.

Sustainability –Sustainability is a central component of what McGill researchers and students study, how they carry out their work, and what the University does to ensure the long-term viability of its research enterprise through maintaining and renewing its infrastructure and core facilities. We encourage McGill faculty, staff, students, and administrators to be citizens who always consider the environmental, social, and economic contexts and consequences of their work.

Collaboration and partnership – Bringing together leaders – regardless of discipline, background, or affiliation – holds great potential to generate new ideas and approaches for solving the most complicated and persistent problems facing our world. On the international level, we are developing research that is more innovative and collaborative while at the same time honouring our history, traditions, and values as a globally minded institution. Within Quebec and Canada, our focus will be on building bridges between our excellent researchers and government, private industry, community-based organizations, and other institutions of higher learning. McGill is committed to facilitating, encouraging, supporting, and rewarding research partnerships across academic fields, both on our campuses and with external partners.

Social engagement – As a leading university, McGill has a responsibility to participate in dialogue and work toward common purposes with community partners. Every day our researchers apply their learning, ingenuity, and creativity to good causes. But there is always more that can be done to extend our contributions and further draw on the strengths and knowledge of different partners and stakeholders: endeavouring to apply research to shared challenges; providing innovative learning environments for students at all levels; and seeking out and supporting initiatives that result in tangible improvements for individual communities. In addition, we are committed to redoubling our efforts to raise awareness about our activities in order to further engage the community and secure future partnerships.

Section 3: Areas of Research Excellence

Explore fundamental questions about humanity, identity, and expression

McGill researchers deepen our understanding of what it means to be a person living in the 21st century. They explore bold and challenging questions – such as "Who are we?" and "How do we express ourselves?" – that form the basis of critical thinking and self-awareness in a complex and interconnected world. Their work has a significant impact on the way we view history, culture, language, aesthetics, religion, ethics, literature, gender, and sexuality, particularly in the context of our increasing interaction with digital technologies. How we access, archive, replicate, and communicate information is rapidly changing, and our researchers are raising concerns and proposing solutions about how we can best protect ideas and individuals in this context. Our contributions to the fields of music technology and performance are also enriching human expression and interaction in the Digital Age.

Key areas:

Ethics

Digital Media

Intellectual Property

Languages, Literature, and Culture

Linguistics

Music, Technology, and Performance

Religion and the Public Sphere

Strengthen public policy and create a deeper understanding of social transformation

Globalization, financial integration, ready access to information, human migration, urbanization, environmental and security issues – societies around the world are being transformed by a host of new social, educational, political, economic and cultural challenges. In many cases, the populace has risen up to resist the authority and traditions of their nation states. The issues that have emerged this century require new forms of global accountability as well as creative approaches to implementing change that build on the strengths of the public, private, and social sectors. Our researchers investigate important questions, such as "How do we make our societies safer, healthier, and more productive, equitable, and sustainable?" Through the comprehensive study of economic, health, educational and social policies; government and institutional structures; law and legal pluralism; demographics; international relationships; integrated management; financial markets; and citizenship, human rights, and diversity,

McGill researchers are defining, analyzing, evaluating, implementing and benchmarking social improvements for individuals and communities, as well as the institutions that organize and serve them.

Key areas:

Education Policy

Environment and Sustainability

Governance and Organizational Structures

Health and Well-being

Law and Legal Pluralism

Leadership and Entrepreneurship

Peace Studies and Human Rights

Social Media

Capitalize on the convergence of life sciences, natural sciences, and engineering

By proposing questions like "How can we deliver solutions for complex life science problems by using specialized methods and tools from engineering?", McGill is poised to make critical advances in sectors ranging from health care and energy to climate change and water resources management. Current bioengineering and related areas of research are broad and interdisciplinary and include groundbreaking work with molecular synthesis, nano-biomaterials, biomedical devices and prostheses, cell and tissue engineering for regenerative therapy, biosensors, drug delivery systems, monitoring and diagnostic devices, and imaging tools. The convergence of life sciences, physical sciences, and engineering also provides new opportunities in food science, sustainable agricultural systems, bioresource engineering, the generation of products for a bio-based economy, and innovative ways of reducing harmful chemical by-products.

Key areas:

Advanced Materials

Biofuels and Bioproducts

Biomedical Devices

Environmental Sciences

Food Science

Green Chemistry

Nanotechnology

Quantitative Biology

Support health research and improved delivery of care

Research and innovation in the understanding of health and disease as well as in the delivery of health care and social services in the 21st century will increasingly focus on the personalized needs of individuals across all stages of life. Building on a long history of outstanding contributions to health research, McGill aspires to be a world leader in translating discoveries from basic research into clinical outcomes and better health care applications and management. We remain focused on using basic research to provide short- and long-term solutions for efficient and high-quality patient care in relation to a wide range of diseases and conditions. A fundamental question rests at the heart of our work in these fields: "How can we help people live healthier lives?" In response, we are developing new approaches to better understand and provide novel solutions to complex health problems, such as cancer, infections, mental health and neurological disorders, chronic diseases that afflict the aging population, and rare and neglected diseases that affect vulnerable populations. Our multidisciplinary approach considers the intrinsic genetic determinants of human health while addressing how environmental and social factors influence individual and collective well-being.

Key areas:

Aging, Chronic Conditions and Diseases

Biobanks, Health Services, and Translational Medicine

Bioinformatics and Systems Biology

Cancer

Cellular and Molecular Mechanisms, Animal Models

Genomics, Proteomics, and Epigenetics

Global Health

Health Management and Promotion

Health Outcomes and Evaluative Medicine

Infection and Inflammation

Personalized Medicine

Preventative, Primary, and Community Care

Unlock the potential of the human brain and the entire nervous system

McGill is one of the world's leading centres for research and education in the neurosciences and related fields. Our researchers cover a tremendous range of study, beginning with the genetic, molecular, and cellular foundations of the nervous system and building up to the networks supporting complex behaviours, including pleasure, emotions, and language. Along the way, they are driven by questions like "How do we ease the burdens of individuals and families whose lives are influenced by degenerative diseases?" and "How can we develop new approaches to deciphering and sharing the enormous amounts of data we can now collect on the brain and nervous system?" McGill is uniquely positioned to produce important advancements in areas such as cognitive neuroscience, imaging, pain, aging, and the prevention and treatment of mental health disorders and neurological diseases.

Key areas:

Aging

Brain Development

Brain Imaging

Cognition

Mental and Behavioural Health

Molecular Biology of the Nervous System

Neuroengineering

Neurological Diseases

Optigenetics

Pain

Sound, Acoustics, and Signal Processing

Redefine the limits of technology and its applications in the Digital Age

One of the distinguishing features of humans is our ability to build upon technologies in the hope of improving our collective condition. Over the past 10 years alone, profound changes have occurred in the way we communicate using technology and in our expectations of what technology will deliver in terms of speed and content. With the Internet's capacity continuing to grow at 50 to 60 per cent annually, the global telecommunications network is now the largest and most complex machine humanity has ever constructed. Even before recent phenomena such as social media, big data, and the use of wireless and optical networks, questions such as "How do we make sense of the previously unimaginable amounts of information that is now at our fingertips?" and "How can we use technology to introduce tangible improvements to how individuals, businesses, and organizations function?" have long been at the centre of McGill research. Our work in the fields of aerospace, data mining, technology's role in education, intelligent machines, supercomputing, and mining and minerals engineering is helping us not only to reimagine the role technology plays in our world, but also in some cases redraw the boundaries of what we can accomplish through science and engineering.

Key areas:

Aerospace

Data Mining

ICT Broadband

Intelligent Machines

Mining and Minerals

Harness the power of the Earth, space, and the universe

Like others throughout history, McGill researchers investigate foundational questions like "What are the origins of life?", "How do we ensure the continued viability of our planet?" and "What are we made of, how do we control it, and how can humanity benefit from it?" What sets McGill apart, however, is our holistic approach to exploring how fields ranging from evolution and agriculture to climate change and cosmology can all provide clues to the same puzzle. Furthermore, our world-class researchers emphasize the importance of translating theoretical work into concrete results, which can often be applied to current local and global challenges. Research in these fields is already influencing how we approach issues related to the safety and security of food, water, and space, as well as how we protect communities and environments affected by climate change.

Key areas:

Astrophysics

Climate Change

Ecology

Energy

Evolution

Food Security

Space

Section 4: "Enabling, Facilitating, Connecting": SRP Implementation Strategy

Implicit in this Strategic Research Plan are a number of overarching themes, which can be summarized by the phrase "Enabling, Facilitating, Connecting." In other words, we hope to "enable" researchers by providing them with the best planning, policies, and infrastructure possible; "facilitate" the development and reinforcement of research excellence through our programs; and "connect" people and organizations by proactively engaging in pairing, matchmaking, and relationship building.

To that end, this SRP has articulated McGill's core commitments and Areas of Research Excellence for the coming years. The final section of the document outlines our strategic objectives as well as a series of high-level "drivers" that will be developed into specific action plans as this vision is realized.

Three strategic objectives will guide the implementation process:

1. Enhance McGill's research capacity
2. Build and strengthen strategic alliances and relationships
3. Emphasize opportunities to increase impact and outreach

The drivers associated with each objective do not appear in order of priority or in a chronological sequence of implementation. Ongoing dialogue with the McGill research community, changes to federal or provincial priorities, or even world events will inevitably require us to review and revise this plan. In order to maintain our ability to adapt quickly, we have deliberately created an SRP that balances stated purpose with flexibility.

As a result, this document does not claim to be a definitive statement on values and priorities. Instead, it should be read as a touchstone to guide the future growth and success of McGill's research enterprise.

Strategic Objectives

1. Enhance McGill's research capacity

Driver 1.1 – Research planning and development

- Implement research priorities in collaboration with the faculties and affiliated hospitals

- Contribute to the stability and long-term planning of research centres and other academic structures to advance research

- Encourage interdisciplinary dialogue and provide additional support for team approaches to addressing large, complex research questions

- Provide seed funding to initiate research activities and enable the organization of strategic initiatives

- Establish a special opportunity fund for research activities that has a strong potential for unique advancement and cannot be funded through existing funding sources

- Improve and maintain infrastructure that supports leading-edge research, with an emphasis on shared and core facilities

Driver 1.2 – Comprehensive research administration

- Build an Office of Research and International Relations that supports research excellence at all stages, from the generation of ideas to their application in society

- Provide proximity support to principal investigators

- Streamline processes to increase efficiency, transparency, and flexibility of post-award management

- Mentor early to mid-career researchers in how to apply for funding

Driver 1.3 – Nexus between research and education

- Collaborate with professors, departments, faculties, and other units to create adaptable and innovative learning environments

- Encourage and highlight student participation in research centres and large-team initiatives

- Enrich the undergraduate research experience

2. Build and strengthen strategic alliances and relationships

Driver 2.1 – Develop proactive strategies to attract diversified funding from external sources

- Engage with industry, both multinationals and SMEs, in areas of priority through a business engagement hub

- Increase collaboration with McGill's Office of Development and Alumni Relations

Driver 2.2 – Strengthen local and regional connections

- Develop stronger relationships with key decision-makers in Quebec and Canada, with the goal of better understanding their objectives and shaping their priorities

- Invigorate platforms dedicated to exchanging ideas, promoting entrepreneurship, and developing community engagement

Driver 2.3 – Refresh and implement a comprehensive internationalization strategy

- Develop and build upon international partnerships in key areas of McGill research excellence

- Identify priority countries and regions for long-term partnerships

- Renew focus on international development and capacity-building

3. Emphasize opportunities to increase impact and outreach

Driver 3.1 – Knowledge mobilization and communication

- Increase channels for exchanging knowledge

- Expedite access to information about McGill research for all stakeholders

- Support McGill activities related to mobilizing knowledge

- Expand visibility, outreach, and service to the community

- Allocate resources toward collaborative and outreach-focused activities

Driver 3.2 – Community engagement

- Work with local and international leaders to identify needs

- Cultivate citizenship, engagement, and professional development activities led by faculty, students, and staff

Driver 3.3 – Commercialization

- Support pre-commercialization and pre-application proof of concept studies, prototyping, and the further development of early-stage technologies with strong potential for commercial or social impact

- Assume an international leadership role in the development and implementation of best practices in intellectual property management